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Competitive bidding for municipal bonds: New tests of the underwriter search hypothesis

Abstract:

*Kessel (1971) hypothesized that underwriters possess specialized knowledge of what their best customers will pay for a prospective bond issue. Kessel found that for a sample of municipal bonds sold between 1959 and 1967 reoffer yields declined as the number of bids received increased up to 10 bids. Benson (1979) extended Kessel's search hypothesis by hypothesizing that search has 2 components: the number of searchers and the intensity of search. Kessel's search hypothesis and Benson's intensity-of-search hypothesis are extended and new estimates of the impact of bidding activity on issuer borrowing **costs** are provided. It is hypothesized that in a market with costly information the benefits of search will be greatest for issues with the highest investor information **costs**. Empirical findings generally support this hypothesis. Findings indicate that the benefits of search were greater for unrated issues, small issuers, and first-time users. A second finding is that underwriters generally provided less search for issues that benefit the most from additional search. Tests indicate that the amount of aggregate underwriter search, as measured by the number of bids submitted and the dispersion of bids, was smaller for low-rated and unrated issues and for smaller issues.*

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INTRODUCTION

The "pay-to-play" controversy of the early 1990s stimulated new research on the impact on issuer borrowing **costs** of the method used to sell new issues of municipal bonds. The new research has not resolved the debate about whether the method of sale has an impact on the borrowing **costs** for issuers of municipal bonds.1 However, the extant literature is consistent in its findings that for municipal issues sold by competitive bidding, an increase in the number of bids received is associated with lower borrowing **costs**.

The primary reason cited in the literature for the reduction in borrowing **costs** as the number of bids submitted increases is the search hypothesis.2 Kessel (1971) hypothesized that underwriters possess specialized knowledge of what their best customers will pay for a prospective bond issue. This knowledge is incorporated in the prices offered by underwriters when bids are submitted. The larger the number of bids submitted, the greater

the probability of discovering the investors who will pay the highest prices for the bonds. Kessel argued that reoffer yields should decline as the number of bids submitted increases because bids constitute search for buyers who will pay the highest prices. According to Kessel, the competitive bidding process is a means for searching the market for investors with the highest offer prices; that is, "competition is search." Kessel found that for a sample of municipal bonds sold between 1959 and 1967 reoffer yields declined as the number of bids received increased up to 10 bids.

Benson (1979) extended Kessel's search hypothesis by hypothesizing that search has two components: the number of searchers and the intensity of search. Kessel's search theory considered the first component, but not the second. Benson measured the intensity of search by the dispersion of bid true interest **costs** (TICs); a lower dispersion of bid TICs implied a greater intensity of underwriter search. Benson (1979) found that TICs on a sample of municipal bonds sold during June, July, and August 1973 declined as the number of bids received increased and as the dispersion of bid TICs decreased.

This article extends Kessel's search hypothesis and Benson's intensity-of-search hypothesis and provides new estimates of the impact of bidding activity on issuer borrowing **costs**. The primary research issue addressed herein is whether the benefits of underwriter search are the same for all issuers. We hypothesize that in a market with costly information the benefits of search will be greatest for issues with the highest investor information **costs**. The empirical findings generally support this hypothesis. Our findings indicate that the benefits of search were greater (issuer borrowing **costs** were lower) for unrated issues, small issues, and first-time issuers. A second finding is that underwriters generally provided less search for issues that benefit the most from additional search. Our tests indicate that the amount of aggregate underwriter search, as measured by the number of bids submitted and the dispersion of bids, was smaller for low-rated and unrated issues and for smaller issues. We attribute this finding to the relative magnitude of the benefits and **costs** of underwriter search.

The article first presents the underlying theory and states the hypotheses, and then presents the empirical results and a summary and assessment of the findings.

THEORY

The Demand for Underwriting Services

In a market with costless information, all investors have the same complete set of information about the credit quality of a prospective bond issuer. If it is assumed that investors interpret the information in the same manner, all investors will form the same estimate of the bonds' intrinsic values and they will establish the same offer prices. At the same time, with costless information, all issuers will have complete knowledge of the offer prices of every investor. Under these conditions, there is no demand for the services of underwriters to intermediate between investors and issuers.

In a market where information is costly, issuers and investors do not have complete information about each other; investors do not know the true creditworthiness of issuers and issuers do not know the identity of investors or their offer prices. In a primary market with costly information, underwriters perform the function of information intermediaries or information specialists (Kumar and Tsetsekos 1993). In this role, underwriters advise the issuer about market conditions and the security characteristics investors prefer, and they locate investors with high valuations of the securities offered for sale.

If information is costly, all investors will not have the same set of information about the creditworthiness of issuers and they will establish different offer prices. Similarly, potential underwriters will not have complete knowledge of the offer prices of all investors. Kessel (1971) hypothesized that each underwriter will have better knowledge of the offer prices of their best customers. "A bid submitted by an underwriter incorporates his knowledge of what his customers are willing to pay for a prospective issue. Hence, bids reveal the underwriters whose customers will pay the most for a forthcoming issue" (Kessel 1971, at 707). Since no single underwriter has complete knowledge of the entire market, as the number of bids submitted increases, the probability of discovering the investors with the highest offer prices increases. That is, the larger the number of competing bidders, the greater the amount of search for the investors with the highest offer prices.

In markets with costly information, underwriters also serve as external agents to provide accurate information about the future prospects of an issuer. An underlying problem in selling risky debt is the potential wealth transfer from investors to issuers. Issuers can be presumed to possess better information regarding their future prospects than do investors; furthermore, investors may fear that the prospects reported by issuers are overstated (Booth and Smith 1986; Beatty and Ritter 1986). If investors are unable to purchase sufficient information on the true prospects of issuers or if issuer assessments of value are not credible to investors, then an Akerlof-type market

failure may result (Akerlof 1970). The potential for market failure and the high **costs** of acquiring information directly create demand for an external agent to provide accurate information that can be used by investors to value securities correctly.

Booth and Smith (1986) develop the underwriter certification hypothesis that issuers employ underwriters as third-party agents to certify to investors that planned offer prices correctly reflect all material information. Investors view the information provided by underwriters as credible because underwriters "post" their reputation as a bond.3 The certification hypothesis has been extended to a number of other third-party agents, including auditors, credit rating agencies, financial advisors, and venture capitalists. In addition, the reputational capital paradigm has been extended by investigating the level of certification among different types of investment banking contracts (e.g., firm commitment, best efforts, negotiated sale, sale by competitive bidding) and the importance of agent reputation on the level of certification.

The Benefits of Search

Standard economic theory suggests that underwriters will search to the point where marginal search benefits equal marginal search **costs**. An implication of the Kessel search hypothesis is that the benefits of underwriter search will be greatest for issues with the highest investor information **costs**.4 Investor information **costs** are the **costs** incurred by investors to determine the creditworthiness of issuers and the offer prices on the issuers' bonds. It is assumed that if investor information demand curves exhibit the standard inverse relationship between **cost** (price) and quantity demanded, as information **costs** increase, each investor will purchase less information. In the aggregate, as the **cost** of acquiring information about an issuer increases, fewer investors will purchase complete information. As a result, the information asymmetry among investors will increase and the dispersion of investor offer prices will increase. Stigler (1961) demonstrated that the larger the dispersion of prices, the greater the expected benefits from additional search. Therefore, the expected benefits of underwriter search should be greatest for issues with the highest investor information **costs**.

Factors Influencing Investor Information **Costs** (Benefits of Search)

Since investor information **costs** influence the benefits of search, it is necessary to discuss the factors that determine these **costs**. To the extent that the production of information has a fixed component, per-bond information **costs** will be higher the smaller the size of the issue, ceteris paribus. Investors acquire information about an issuer's creditworthiness every time an issuer sells bonds. Since the financial condition of issuers changes over time, information about issuers' creditworthiness becomes obsolete with the passage of time. Therefore, the **costs** of determining the creditworthiness of an issuer in connection with a new issue will be lower for more frequent issuers, ceteris paribus.

Insurers of municipal bonds guarantee the timely payment of issuers' debt service obligations. If investors view triple-A-rated insured bonds as a homogeneous class of securities (i.e., as a commodity) with a low level of default risk (owing to the insurance), they may feel that there is no need to expend time and money to determine the creditworthiness of the issuer. Under these conditions, insured bonds will have very low information **costs**, ceteris paribus. Bond ratings provided by independent rating agencies also reduce the **costs** of determining an issuer's creditworthiness. The range of credit quality in a rating category, however, can be large, so ratings provide only an estimate of an issuer's creditworthiness.5 Therefore, for noninsured rated bonds, investors will have to acquire additional credit quality information. As a result, noninsured rated bonds will have higher information **costs** than insured bonds, ceteris paribus. At the other end of the spectrum are unrated bonds on which investors must generate and pay for all credit quality information. Therefore, unrated bonds will have higher information **costs** than rated bonds, ceteris paribus.

The **Costs** of Underwriter Search

We hypothesize that underwriter search **costs** are a function of the ease with which underwriters can determine the level of investor demand for the bonds.6 To the extent that investors have a stronger preference (demand) for bonds with higher credit quality, the **costs** of search should be lower for higher-rated issues, ceteris paribus. The preferences of investors and the population of investors in the municipal market change over time. Therefore, information about investor demand becomes obsolete with the passage of time. Consequently, the more frequently an issuer sells bonds, the lower the **costs** of acquiring information about the demand for new issues, ceteris paribus. If underwriter search **costs** have a significant fixed component, then per-bond search **costs** will be greater for smaller issues.

Underwriter search **costs** may also be influenced by the bank-qualified status of the bonds. In theory, commercial banks should purchase only bank-qualified bonds (Forbes and Leonard 1994). Therefore, bank-qualified issues

have an easily identified investor group-commercial banks-in addition to individuals and other institutional investors. Underwriter search **costs** may also be lower on issues that appeal primarily to institutional investors as opposed to those that appeal to retail investors. Workman and Apfel (1995) argue that for bonds that appeal predominantly to retail investors, it is harder to gauge precisely the level of investor demand without first canvassing the market, a task that is labor intensive and not practical given the constraints of bidding. Workman and Apfel identify shorter-term bonds as appealing to retail investors, while others (e.g., Kidwell and Koch 1983) identify property and casualty insurance companies as the marginal investor group for long-term bonds. Therefore, if retail investors are the marginal investor group in the market for shorter-term maturities, we would expect search **costs** to be higher for shorter-term bonds. Conditions in capital markets at the time of issue may also affect underwriters' search **costs**. To the extent that uncertainty about investor demand for bonds varies with the level of interest rates, search **costs** will vary with the level of rates. Uncertainty about the demand for bonds may also be related to the bonds' security provisions (general obligation versus revenue) if bonds with different security provisions are preferred by different investor groups? Therefore, search **costs** may be different for general obligation and revenue bonds.

HYPOTHESES

The primary empirical issue investigated in this article is whether the benefits of underwriter search are the same for all issuers. Stated differently, we want to know if the reduction in issuers' borrowing **costs** resulting from an increase in bidding activity is the same for all issuers. We posit that the benefits of underwriter search will be greatest for issues with the highest investor information **costs**. This conjecture has three testable components:

HoA: The benefits of underwriter search are greatest for unrated issues and smallest for triple-A-rated insured issues.

HoB: The benefits of underwriter search are greatest for smaller issues.

HoC: The benefits of underwriter search are greatest for less frequent issuers.

The benefits of search are measured by analyzing an issuer's total borrowing **cost**. The amount of search is measured by the number of bids submitted and the dispersion of underwriters' bids. Benson (1979) suggested that the total amount of underwriter search is determined by both the number of searching underwriters (bidders) and the intensity of search of each searching underwriter. Benson used the dispersion of bids as a measure of search intensity. This measure is suggested by the work of Stigler (1961), Garbade and Silber (1976), and Marvel (1976) and is based on the theory that the dispersion of prices in a market is inversely related to the amount of search by individual market participants. Therefore, we expect that borrowing **costs** will be lower, for a given increase in the number of bids and a given decrease in the dispersion of bids, for unrated issues, smaller issues, and less frequent issuers, ceteris paribus.

ANALYSIS

Description of the Data

The data analyzed consist of a sample of 937 municipal bonds sold by competitive bidding between August 1992 and December 1992. The primary source of data was the Bond Buyer worksheet series. All issues sold between August and December 1992 for which complete information was available were included in the sample. Summary information on the sample is presented in Table 1. The mean size of issues in the sample is $13.7 million and the mean average maturity is 10 years. Among the issues in the sample, 23 percent are revenue bonds, 60.3 percent are bank qualified, 20 percent are refunding, and 79 percent are callable. The distribution of issues by rating is 26.5 percent Aaa-insured, 2.9 percent Aaa-rated, 17.3 percent Aa-rated, 35 percent A-rated, 8.3 percent Baarated, and 10 percent unrated. Twenty-five issues (2.7 percent) received one bid, 14.4 percent received two bids, 21 percent received three bids, 22.4 percent received four bids, 16.7 percent received five bids, and 22.8 percent received six or more bids.

Methodology for the Tests of the Benefits-of-Search Hypotheses

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A considerable body of research exists on the determinants of the total interest **cost** on individual tax-exempt bond issues. These studies demonstrate that interest **costs** vary with the overall level of capital market rates at the time of issuance, issue and issuer characteristics (such as issue size, maturity, and rating), and local market conditions such as state income tax rates. The basic interest **cost** model used in prior research is expanded by adding two measures of underwriter search. The model, estimated by ordinary least squares regression, is:

Net interest **cost** (NIC) is the dependent variable. NIC is used rather than true interest **cost** (TIC) because the majority of the competitive bid sales during the sample period awarded the bonds on the basis of NIC. BB120 is a measure of the general level of interest rates at the time of issuance and is expected to have a positive coefficient. The Bond Buyer index of 20 bonds is computed weekly; the index consists of 20 general obligation bonds that mature in 20 years. The average rating of the bonds in the index, as computed in 1992, is equivalent to Ⓜ Moody's A-1.9

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TABLE 1.

CALLABLE indicates whether an issue is subject to optional redemption (call) prior to the stated final maturity. CALLABLE is expected to have a positive coefficient reflecting the call risk premium required by investors on callable bonds. REVENUE indicates whether an issue is a revenue bond, as opposed to a general obligation (GO) bond (the omitted category). REVENUE is expected to have a positive coefficient, since the payment streams backing revenue bonds are considered by investors to be riskier than the full faith and credit backing of GO bonds. REFUND indicates whether an issue was sold to refund a currently outstanding issue. REFUND is expected to have a negative coefficient, since the refunding of high-**cost** debt should reduce an issuer's risk of default.

LOGMAT measures the impact on yields of increases in maturity. Since the municipal market yield curve has a positive slope, LOGMAT is expected to have a positive coefficient. TAX is used as a measure of demand for tax-exempts by individual investors. TAX is expected to have a negative coefficient. This indicates that a more favorable tax treatment of interest on in-state tax-exempts increases in-state investor demand and leads to higher prices and lower reoffer yields.

A difficulty in measuring the effects of issue size is the fact that all bank-qualified issues are, by definition, $10 million or less in amount. Therefore, issue size and bank-qualified status are strongly correlated. To overcome

this problem, three dummy variables are created: LARGE, SMALLBQ, and SMALLNOTBQ. LARGE is a dummy variable equal to one if the issue is larger than $10 million, zero otherwise. LARGE is the omitted variable in the regression model, so SMAL[BQ measures the differential impact on NIC of issues less than or equal to $10 million that are bank qualified relative to issues larger than $10 million. SMALLNOTBQ measures the differential impact on NIC of issues less than or equal to $10 million that are not bank qualified relative to issues larger than $10 million. AAAINS is included as a variable separate from AAA to reflect the fact that, even though they both have triple-A ratings, insured bonds are not priced the same as natural triple-A-rated bonds. A-rated bonds are the omitted class, so AAAINS, AAA, and AA are expected to have negative coefficients and BAA and NR are expected to have positive coefficients.

The first measure of underwriter search, number of bids (LOGBIDS), is specified in logarithmic form to reflect the fact that the marginal impact on NIC of additional bids declines as the number of bids submitted increases. LOGBIDS is expected to have a negative coefficient. The second search variable, DISPERSION, is expected to have a positive coeffcient, since a smaller dispersion of bids implies more intensive search.

Results of the Tests of the Benefits-of-Search Hypotheses

As a starting point the NIC regression is estimated on the entire sample. See Table 2. This model is included for comparison purposes only; it is similar to the standard model used in previous studies of competitive bidding. All of the coefficients have the expected signs and the model explains 87.3 percent of the variability in NIC. The coefficient on LOGBIDS is negative and statistically significant, indicating that NIC declined, at a decreasing rate, as the number of bids increased. The coefficient on DISPERSION is not statistically significant, indicating that, on average, differences in the dispersion of bids had no impact on NICs. A possible explanation for the lack of statistical significance of DISPERSION may be that it is highly correlated with number of bids. The correlation coefficient between the variables, however, is only 0.014; furthermore, DISPERSION is not statistically significant when LOGBIDS is omitted from the equation. Without further analysis, these results suggest that an increase in the number of bids submitted substantially reduced NICs for all issues in the sample, but that the dispersion of bids had no impact on NICs. As the analysis below indicates, these would be incorrect conclusions.

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TABLE 2.

To test the first benefits-of-search hypothesis the sample was divided into three subsamples containing insured issues, noninsured rated issues, and unrated issues. Our hypothesis suggests that the benefits of search will be greatest for unrated issues and smallest for triple-A-rated insured issues. The results of the NIC regression for the the subsamples are presented in Table 3. In order to conserve space, only the coefficients for LOGBIDS and DISPERSION are presented. For triple-A-rated insured issues, the coefficient on LOGBIDS is -0.058 and it is significant at the 5 percent level. On the other hand, for unrated issues, the LOGBIDS coefficient is -0.562 and it is significant at the 1 percent level. The results for noninsured rated issues are between those for insured and unrated issues (the LOGBIDS coefficient is -0.188). These results are consistent with the benefits-of-search hypothesis. Issues with the highest investor information **costs** (unrated issues) benefited significantly when the number of bids submitted increased, while issues with very low information **costs** (insured issues) received much smaller benefits from an increase in the number of bids submitted. For instance, for triple-A-rated insured issues, an increase in the number of bids from three to four reduced NIC by 1.6 basis points, on average, while the reduction in NIC for unrated issues was 16.2 basis points, on average.

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TABLE 3.

The results for DISPERSION cannot be easily explained. The benefits-of-search hypothesis posit that a smaller dispersion of bids is the result of a higher intensity of search; as a result, the dispersion of bids and NIC should be be directly related. For triple-A insured issues, an increase in the dispersion of bids is associated with a decrease in NIC; for noninsured rated issues, the opposite (expected) result is observed. DISPERSION is not statistically significant for unrated issues. Since the benefits-of-search hypothesis predicts that the coefficient on DISPERSION should be larger and more significant for unrated issues, the results do not support the hypothesis. The results for triple-A-rated insured issues are particularly perplexing, since the observed relationship is the opposite of the relationship expected.

To test the second benefits-of-search hypothesis the sample was divided into three subsamples: issues less than or equal to $5 million, issues less than or equal to $10 million, and issues larger than $10 million. The hypothesis predicts that the benefits of search will be greatest for the smallest issues and smallest for the largest issues. The search variables for these regressions are presented in Table 4. As predicted, the benefits of underwriter search are greatest for the smallest issues. For issues of $5 million and less, the LOGBIDS and DISPERSION coefficients have the expected signs and they are statistically significant at the 1 percent level. In addition, the coefficients have the largest absolute values, indicating the greatest benefits of search. For issues of $10 million and smaller, the LOGBIDS coefficient is smaller and statistically significant, while the coefficient on DISPERSION is not statistically significant. For issues larger than $10 million, the coefficient on LOGBIDS is significantly smaller in size and statistically significant; the coefficient on DISPERSION is not statistically significant.to Taken together, these results indicate a systematic increase in the benefits of underwriter search as issue size decreases.

TABLE 4.

To test the third benefits-of-search hypothesis the sample was divided into two subsamples: issuers that sold an issue within the last year and first-time issuers (no previous issues). The benefits-of-search hypothesis posits that the benefits of search will be greatest for first-time issuers. The search variable estimated coefficients for the regressions are presented in Table 5. As predicted, the coefficient on LOGBIDS is larger in absolute size and more statistically significant for first-time issuers. DISPERSION is not statistically significant in either regression.

In summary, the empirical findings are generally consistent with our **predictions**. The benefits of search, as measured by the impact on NIC of an increase in the number of bids submitted, was greatest for unrated issues, small issues, and first-time issuers, ceteris paribus. The measure of search intensity (DISPERSION) was statistically significant in the subsampies of noninsured rated issues and issues of $5 million or less; however, it had the incorrect sign in the sample of insured bonds.

Methodology for Tests Concerning the Amount of Search

A logical next question is whether underwriters actually provide more search for issues that receive the greatest benefits of search. This issue can be explored by examining the factors that influence the amount of search provided by underwriters. The search regression model is:

and all other variables are as defined for the NIC equation.

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The dependent variables, NUMBIDS and DISPERSION, measure the number of searching underwriters and the average intensity of underwriters' search effort, respectively. The actual amount of search provided will be determined by the marginal benefits of search relative to the marginal **costs** of search. The benefits of search are determined by the dispersion of investor offer prices, which are in turn determined by investor information **costs**. The **costs** of search are determined by the ease with which underwriters can assess investor demand. As discussed earlier, factors that may impact the benefits or **costs** of search include credit quality (rating), issue size, frequency of issue, maturity, bank-qualified status, the level of interest rates, and security structure. These factors are included in the model as explanatory variables. The STATE variables are included to capture differences in state underwriting markets. For reasons that are not immediately apparent, the average number of bids submitted varies greatly from the sample mean in several states. The largest deviations from the sample mean (4.5 bids) were observed for issues sold in Illinois (7.5 bids), New Jersey (2.7 bids), New York (2.8 bids), Texas (5.6 bids), and Wisconsin (6.8 bids).

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TABLE 5.

The expected signs of each explanatory variable in the model are determined by the marginal benefits of search relative to the marginal **costs** of search for that variable. Unfortunately, there is no existing theory about whether the marginal benefits for a variable are greater than, equal to, or less than the marginal **costs**. As a result, we cannot make a priori **predictions** about the expected signs of the variable coefficients. Whether the marginal benefits exceed the marginal **costs** for a variable is therefore an empirical question. Our empirical investigation allows us to answer the important question of whether underwriters supply more or less search to issues that benefit the most from additional search.

Although we cannot make a priori **predictions**, we can interpret the signs of the coefficients. A positive (negative) coefficient in the NUMBIDS equation indicates that more (less) search was provided. This implies that the marginal benefits of search exceeded (were less than) the marginal **costs** of search for that factor. A negative (positive) coefficient in the DISPERSION equation indicates that underwriters searched more (less) intensely. This implies that the marginal benefits of search exceeded (were less than) the marginal **costs** of search for that factor.

Results of the Amount of Search Tests

The results of the search equations are presented in Table 6. Bankqualified issues received, on average, an additional 0.846 bids and the standard deviation of NICs (dispersion of bids) was 1.23 basis points lower. Issues sold when the level of interest rates was higher received fewer bids and had a greater dispersion of bid NICs. Longer-maturity issues received fewer bids, but they had smaller dispersions of bid NICs. Revenue bonds received the same number of bids, on average, and had the same dispersion of NICs, on average, as general obligation bonds. Issues sold in New York and New Jersey received on average 1.78 and 1.51 fewer bids, respectively, than issues sold in other states. Issues sold in Texas, Wisconsin, and Illinois received on average

1.40, 2.00, and 2.47 more bids, respectively, than issues sold in other states. Only issues sold in New York had a statistically significant difference in the dispersion of bid NICs. New York issues received, on average, fewer bids, but the dispersion of bids was 1.88 basis points lower.11

The results reported in Table 3 indicate that unrated issues received the greatest benefit from additional bidding activity. As shown in Table 6, however, unrated issues received, on average, significantly fewer bids than all issues except those rated Baa. In addition, unrated issues had, on average, significantly higher bid NIC dispersions. Insured issues, which received the least benefit from additional search, did not receive more bids, on average, than A-rated issues. Triple-A insured issues, however, had, on average, a lower dispersion of bid NICs, indicating more intensive search. The results reported in Table 4 indicate that issues of $5 million and less benefited the most from additional search. The results shown in Table 6 indicate that issues of $5 million and less received the same number of bids, on average, as issues larger than $10 million, but fewer bids than issues larger than $5 million and less than or equal to $10 million. The dispersion of bid NICs, however, was, on average, significantly larger for issues of $5 million and less, indicating less intensive search on the smallest issues. The results shown in Table 5 indicate that first-time issuers received the greatest benefit from additional search. The results shown in Table 6 indicate that there was no difference in the number of bids or the dispersion of bid NICs for first-time, frequent, and infrequent issuers.12

CONCLUSIONS

The empirical findings presented in this article indicate that the benefits of underwriter search, as measured by the impact on NIC of an increase in the number of bids submitted, was greatest for unrated issues, small issues, and first-time issuers. The measure of search intensity (DISPERSION) is statistically significant in the subsamples of noninsured rated issues and issues of $5 million or less; however, it has the incorrect sign in the sample of insured bonds. These findings are generally consistent with the hypothesis that the benefits of additional bidding activity are an increasing function of investor information **costs**.

TABLE 6.

Additional analysis indicates that the actual amount of search provided, as measured by the number of bids submitted and the dispersion of bid NICs, was generally not greater for issues that receive the most benefits. In fact, unrated issues actually received less aggregate search than rated issues (except those rated Baa) and insured issues, and issues of $5 million or less received less aggregate search than larger issues. These findings suggest that for some issues with the largest benefits of search, search **costs** are even higher, so less search is provided (e.g., unrated issues). In other instances, issues with the largest benefits of search have approximately equally high search **costs**, so the advantage of search is negated (e.g., first-time issuers).

Our findings suggest that the results of previous research on the impact of competitive bidding on issuer interest **costs** must be reconsidered. In previous studies, the results show only the average effect of additional bidding activity. As the findings in this article indicate, the impact of additional bidding varies substantially across issues.

Finally, in the process of assembling the data set for this study we observed systematic differences in bidding activity in several states. Our empirical analysis indicates that these differences are statistically significant in some cases. An interesting area of future research would focus on the underwriting structure of statewide markets. Of particular interest would be a study of the factors that influence the bidding activity in each market.

[Footnote]

1. Workman and Apfel (1995) argued that "the issue of competitive versus negotiated issuance is not a question of which but rather of under what conditions ...."Consistent with this view, Leonard (1996) concluded that issuers rationally selected the method of sale that they believe will minimize expected borrowing costs. Leonard also found that method of sale had no impact on municipal borrowing **costs**. He suggested that the results of previous studies may be biased because they failed to use the appropriate statistical methodology to correct for a pooling of data problem. In contrast, Simonsen and Robbins (1996) found that recent Oregon municipal issues sold by competitive bidding had lower borrowing **costs**. Simonsen and Robbins did not, however, address the pooling of data problem raised by Leonard.

[Footnote]
2. In a series of articles, West (1965, 1966, 1967) developed and tested the monopsony-concession pricing hypothesis. According to this view, investment bankers collude to eliminate competitive bidding. Potential bidders either join the single bidding syndicate or refrain from bidding. Those that refrain are rewarded by being allowed to purchase bonds at the below-market offer price. After the syndicate breaks, the bonds can be resold in the secondary market at the higher market price. West found that for samples of municipal bonds sold during the late 1950s and early 1960s issues that received more than one bid had lower reoffer yields, spreads, and net interest **costs** (NICs).

[Footnote]
3. The certification hypothesis is an extension of Klein and Leffler's (1981) reputational signaling model. This model shows that as long as a firm has an investment in nonsalvageable capital (e.g., its reputation) that exceeds the one-time gain from cheating (overstating quality), product quality can be assured. This ocurs because the firm is able to earn a stream of quasi-rents on its nonsalvageable capital (reputation) as long as it does not misrepresent product quality.
4. Underwriters benefit from discovering the investors with the highest offer prices because this increases their chance of submitting the winning bid.

[Footnote]
5. The security features and sources of pledged cash-flow streams of bonds in a rating category vary widely (e.g., revenue bonds backed by specific enterprise revenues versus general obligation bonds backed by the issuer's full faith and credit pledge). This situation is acknowledged in previous empirical research where independent variables are included in interest **cost** models to control for issue purpose and type of security.

[Footnote]
6. This hypothesis is similar to Kessel's argument that the amount of underwriter search is a function of market breadth. Kessel defined the "broadness" of a market by the number of investors in each credit quality category and argued that "it follows that the economic resources going into search by underwriters ought also to be a function of the quality of the issue to be distributed" (Kessel 1971, at 728 n.34).

[Footnote]
7. For example, pledging requirements in some states do not allow revenue bonds to be used as collateral for public deposits. Therefore, commercial banks have a stronger demand for general obligation bonds, ceteris paribus.
8. Benson (1979) points out that there may be overlapping search by underwriters. Net aggregate search will increase with the number of and/or intensity of searches as long as the additional search does not completely duplicate existing search.

[Footnote]
9. The Salomon Brothers 10-year prime grade index was also used in the regressions. There were no significant differences in the results using this index.

[Footnote]
II. When the STATE variables are included in the NIC equation, they are not statistically significant. Therefore, there was no separate state effect on NIC.

[Footnote]
12. Although FIRSTIME was not statistically significant in the NUMBIDS equation, 14 of the 25 issues that received only one bid were first-time issuers.

[Reference]
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